

Appl. No. 10/716,006
Amendment Dated July 21, 2006
Reply to Office Action of June 19, 2006

REMARKS

New claims 54-63 have been added to more thoroughly define the subject matter applicants regard as their invention. Support for the limitations in the new claims can be found in the original claims as well as in Paragraphs 0008, 0010 and 0021 of the specification and, in particular in Figs. 3, 5, 6 and 8.

Procedural Matters

Applicants begin by requesting the examiner to withdraw the final status of the office action of June 19, 2006. MPEP §706.07(a) is clear. A final rejection which cites new prior art against an unamended claim is improper, unless the art was cited in an IDS submitted under 37 CFR § 1.97(c). Here, no IDS has been filed and the examiner has cited new prior art, Hurtos et al. and Swanson et al., against claims that were not amended, claims 21-42. That being the case, the final status of the office action of June 19, 2006, is improper.

Accordingly, this amendment should be entered as a matter of right.

Substantive Matters

Neither Hurtos et al. or Swanson et al. shows or suggests a process for controlling the stress in a silicon carbide film formed by low pressure chemical vapor deposition by controlling the pressure of the reaction system, as expressly set forth in previous claim 1 or current claim 54.

Thus for example, Swanson et al. makes clear in its Conclusion section on page 1758 that the stress of polycrystalline films grown by low temperature chemical vapor deposition is sensitive to (1) temperature, (2) TMS flow and (3) film thickness. Nothing, however, is said about pressure. This would indicate to a person of ordinary skill in the art that the stress in such a film can be controlled by varying (i.e. controlling) temperature, TMS flow or film thickness, but not pressure. Thus, Hurtos et al. fails to anticipate or suggest claim 1, because it fails to disclose or suggest **controlling** residual stress by **controlling** pressure.

As best understood by applicants, the examiner's position in this rejection is that residual stress is **inherently** controlled in the Swanson et al. process because it is necessarily conducted at some pressure. If this position were correct, then every U.S. Patent in which a new control

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philosophy is used to control an otherwise old process would be invalid as anticipated by this old process. This is obviously not the law.

See, for example, *Diamond v. Diehr*, 450 U.S. 175, 209 U.S.P.Q. 1 (1981), which dealt with the patentability, under 35 USC §101, of a process for making tires in which the operation of the tire-making machine was controlled in accordance with a particular mathematical formula, i.e. an algorithm. The inventors had found that the consistency and reliability of the tire-making process could be enhanced, significantly, if the various parameters defining the process (e.g. time, temperature, pressure, etc.) were controlled in a particular way, all as defined by the algorithm. The PTO refused to grant a patent on the basis that the point of novelty of the invention, computer control according to the algorithm, was not patentable subject matter under 35 USC §101. The Supreme Court rejected this contention and held that, so long as the invention claimed as a whole was drawn to patentable subject matter, it satisfied the requirements of 35 USC §101.

Although Diehr dealt with patentability under 35 USC § 101, it is nonetheless instructive because its facts bear remarkable similarity to the present situation. In particular, the problem faced by Applicants here is essentially the same problem faced by the inventors in Diehr, namely, a prior art process works sometimes but doesn't work other times and no one knows why. Moreover, the approach taken by the Examiner here is essentially the same approach taken by the Examiner in Diehr and condemned by the Supreme Court, namely, focusing only on the conventional physical steps claimed while disregarding the particular data manipulation steps claimed which control and limit how these physical steps are carried out.

Thus, in Diehr, the problem was that operation of commercial tire-making machines according to the best information available at the time sometimes produced good tires but other times did not. The inventor's solution to that problem, controlling the tire making process according to a particular algorithm in a computer, meanwhile, was totally disregarded by the Examiner in determining patentability:

"The patent examiner...determined that those steps in respondents' claims that are carried out by a computer under control of a stored program constituted nonstatutory subject matter.... The remaining steps — installing rubber in the press and the subsequent closing of the press — were 'conventional in nature and cannot be the basis of patentability.'" 209 U.S.P.Q. at 5

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In striking similarity to Diehr, the problem in the present situation is that industrially produced silicon carbide films often include residual stress which negatively impact the other properties of the film. Also in striking similarity to Diehr, the Examiner here has also disregarded the steps in applicants' claims regarding applicants' solution to this problem, namely, controlling these stresses by controlling reaction pressure, and instead focuses solely on the otherwise conventional chemical vapor deposition steps of applicants' claims.

The Supreme Court made clear in Diehr that

"It is inappropriate to dissect the claims into old and new elements and then to ignore the presence of [those] elements" not supporting the examiner's position.
209 U.S.P.Q. at 9.

Accordingly, the Examiner's approach in this case — disregarding those limitations in applicants' claims relating to controlling residual stress by **controlling pressure**— is also not well taken.

As for Swanson et al., nothing is said in this reference about residual stresses being sensitive to or a function of reaction pressure. Accordingly, this reference also fails to disclose or suggest controlling residual stresses by controlling pressure, as recited in previous claim 1 and current claim 54.

Claim 21, meanwhile, specifies that silicon precursor flow rate is **controlled** (i.e. varied) so as to control the residual stress in the product silicon carbide film while the flow rate of the carbon precursor remains **fixed** at a predetermined value. This means the **ratio** of the silicon precursor flow rate to the carbon precursor flow rate is **controlled** (i.e. varied) to achieve the desired result. Hurtos et al. obviously fails to disclose or suggest such a process, since it uses a single reactant TMS in which the silicon/carbon ratio is necessarily fixed and constant. The same applies to current claim 54.

Swanson et al., meanwhile, does indicate that a silane/methane mixture can be used as reactants for formation of a silicon carbide layer. However, there is no indication that these reactants are **separately supplied**. Hence, there is no disclosure or suggestion in this reference that residual stresses could be controlled by controlling (i.e. varying) silicon precursor flow rate while holding the carbon precursor flowrate at a **predetermined fixed value**, as claimed.


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As indicated in the prior amendment, anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. MPEP § 2131. Here, none of the cited references discloses controlling residual stress by **controlling pressure**, as specified in claim 1 (and 54), or controlling residual stresses by controlling silicon precursor flow rate while keeping carbon flow rate at a **predetermined fixed** value, as specified in claim 21 (and 54). Accordingly, the current rejections are not well-take and should be withdrawn.

If any fee is due with this amendment, please charge our deposit account no. 03-0172.

Respectfully submitted,

Date: _____


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